Cooperative Extension Service
C/T/A/H/R
College of Tropical Agriculture & Human Resources
University of Hawaii at Manoa

Insect Pests
May 2001
IP-8

Scouting for Thrips in Orchid Flowers

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Thrips are the most common insect pest of orchid flowers in Hawaii. Thrips can be controlled using appropriate pesticides either in the field or as a post-harvest dip.

Some growers apply insecticides to orchid crops on a calendar basis, without checking first to see if pests are present. But not all orchid farms in Hawaii have problems with thrips, and therefore this practice may not be cost-effective and might result in the eradication of beneficial insects that normally keep pests such as whiteflies and aphids under control. In general, pesticide applications should be made only when the number of pests has exceeded a certain tolerance level, or threshold, as determined by pest scouting.

In deciding on a threshold level for thrips in orchids, a grower should consider how the crop is to be marketed. If the flowers are to be sold within the state of Hawaii, a light thrips infestation (an average of < 1 insect per orchid spray) can be tolerated, because light infestations will not damage flowers. However, if the number of thrips appears to be increasing, growers should consider applying insecticides. Once thrips become well established, they will be hard to control, because their pupae in the soil may escape treatment. Successive, carefully timed insecticide sprays are needed if this occurs.

If the flowers are to be exported from Hawaii, the grower is responsible for shipping flowers that are free of thrips and other pests. Otherwise, quarantine inspectors may reject flower shipments and the Cut Flower Compliance Agreement stamp issued by USDA-APHIS may be revoked. Obviously, growers who export must adopt a pest tolerance threshold of zero, or else use an effective treatment after harvesting.

Scouting methods

Three methods can be used for pest scouting; their advantages and disadvantages are summarized in Table 1.

Direct observation

Direct observation of thrips in blossoms is a good, nondestructive method, but it is relatively time-consuming. Thrips typically hide deep within the blossoms. The lip

Table 1. Comparison of three methods for counting thrips in orchids.

Detection method	Advantages	Disadvantages	Use when goal is	Efficiency of counting*	
				Adults	Nymphs
Direct observation	No equipment required, consistent results if same person counts	Time-consuming, requires good eyesight	To monitor the level of the thrips population	79%	14%
Flower shake	Fast method, instant results	May damage sprays if shaken too hard	To detect thrips	48–93%	4–22%
Berlese funnel	Produces consistent results	Time and expense of funnel construction, limited amount of plant material can be processed	To monitor the level of the thrips population	34–59%	14–17%

*Efficiency data from Hollingsworth et al. (2000).

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of each blossom must be gently pulled down to detect whether thrips are inside. An experienced person can generally examine all of the blossoms of one orchid spray in less than a minute. The person sampling must have good eyesight and be able to distinguish between thrips and other small insects commonly encountered, including other pests, such as aphids, as well as beneficial insects, such as parasitic wasps and other predatory insects, that feed on thrips. Use of a hand lens is helpful to distinguish among these insects. In general, thrips adults will be more easily seen on light colored flowers, while thrips nymphs (which are light in color) will be more easily seen against a dark background.

Flower shake

Shaking flowers to dislodge thrips is a second sampling method that is much faster than visually inspecting individual flowers. A single orchid spray should be shaken for 5 seconds within a white bucket or plastic bag. The shake should be of moderate intensity—too vigorous a shake will bruise or damage the flowers, reducing shelf life. Research has shown that flower shakes remove from about half to almost all of the adult thrips present but less than a quarter of the nymphs (Table 1).

Berlese funnel

Another method for scouting thrips involves putting the flowers into a specially constructed funnel beneath a brooder lamp, using the heat from the light source to drive the thrips down to a collecting jar at the bottom of the funnel. This sampling device is called a Berlese funnel; it can be easily constructed from locally available materials. Insects collected in the jar can be examined and counted with the aid of a microscope or hand lens, or they may be taken to an expert for identification.* Identification could be important, because there are several different species of thrips commonly found in orchid flowers, and certain species may be harder to control with insecticides.

Berlese funnels are particularly good for detecting the presence of thrips while they are still small, as these stages would probably be overlooked using the other two scouting methods.

*For a small fee, insects can be identified by CTAHR's Agricultural Diagnostic Service Center (ADSC). Samples can be submitted through any CTAHR Cooperative Extension Service office. On Hawaii, the ADSC is located at the Komohana Agricultural Complex in Hilo. Thrips should be submitted in 70% alcohol.

Some growers have asked if sticky cards can be used for sampling thrips in orchids. Yellow and blue sticky cards have been used effectively to sample western flower thrips in vegetable and flower greenhouses. We tested a wide variety of card colors (including blue and yellow) in an orchid shadehouse known to be infested with western flower thrips, suspending the sticky cards just above the plant canopy. We had very little success collecting thrips of any kind. Therefore, we cannot recommend this technique at this time.

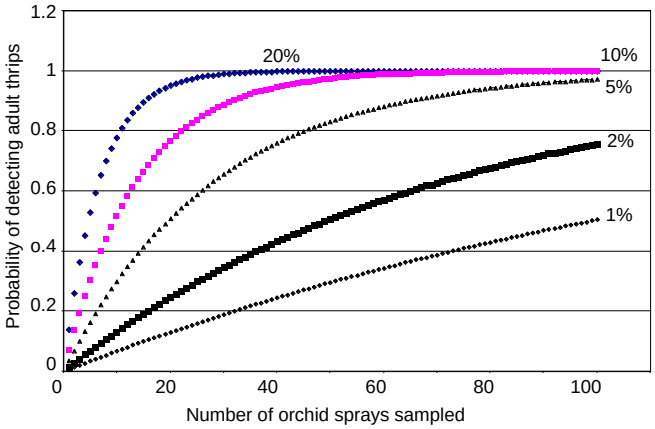
How to collect samples

Regardless of the method you choose, you should collect the samples evenly throughout any area you are managing as one unit. The number of samples to collect depends on your reason for scouting and the level of thrips present in the crop.

Growers who seldom find thrips may decide to implement control measures when only a small percentage of orchid sprays are infested. Those who take this approach will want to sample a large number of orchid sprays, and this can be done most efficiently by the flower shake method. Our research indicates that orchid sprays infested with adult thrips are randomly distributed in an orchid crop, not clumped together. Using this information, it is possible to calculate the probability of detecting adult thrips for a given number of orchid sprays sampled, provided that the infestation rate and the efficiency of the sampling method are specified. This is shown in the graph in Figure 1, which assumes a 70% efficiency of counting, such as might be obtained using the shake method of sampling.

Other growers may have chronic problems with thrips because thrips are constantly flying in from surrounding areas. These growers may want to use scouting results to monitor the level of thrips in the crop, in order to better time pesticide sprays. In such circumstances, thrips will likely be relatively easy to find using any method. The emphasis should be on using a method that produces consistent results. Berlese funnel extractions might be most appropriate, because consistent results can be achieved even if different people collect the samples. The best way to determine how many orchids sprays to sample is to compare results obtained using several different sample sizes. The minimum sample size that produces consistent results should be selected.

Figure 1. Probability of detecting adult thrips as a function of sample size and the percentage of orchid sprays infested with adult thrips.



Constructing a Berlese funnel

(from Tenbrink et al. 1998)

Materials needed:

- 10-inch automotive funnel (Balkamp brand, Napa Auto Parts, part #8211 126)
- 1 square foot of ¼-inch-mesh galvanized hardware cloth
- 4-ounce jar with screw-on lid, such as a baby food jar
- 10-inch brooder lamp (Woods Wireproducts brand, Ace Hardware, item #30715)
- 40-watt incandescent light bulb (do not substitute a bulb brighter than 60 watts)
- 4 pieces of ¾-inch galvanized plumber's tape, each 4¼ inches long
- 8 ⅛-inch aluminum rivets
- Liquid Nails® adhesive

Tools needed:

- Electric drill with ⅛-inch drill bit
- Hole saw bit the same size as the funnel spout diameter
- Rivet gun
- Tin snips
- Pliers

Procedure for construction:

1. Remove the filter screen from the funnel.
2. Cut the hardware cloth to fit and place it in the funnel.
3. With the hole saw bit, cut a hole in the center of the jar lid. Use Liquid Nails adhesive to glue the lid onto the spout of the funnel about ¼ inch up from the bottom of the spout so that the jar can be screwed onto the lid.
4. Bend four pieces of plumber's tape so that when evenly spaced around the lamp they will hold the lamp just above the funnel. Drill ⅛-inch holes in the lamp and rivet the plumber's tape to the lamp. Adjustments can be made by bending the plumber's tape so that the lamp rests just above the funnel.
5. The funnel cannot stand on the small jar at the bottom; therefore, it needs to be supported in a box or bucket. A frame constructed from wood or galvanized pipe can be used to support one or more funnels.

Using the Berlese funnel

Additional supplies needed: a hand lens or magnifying glass (least 10X) and 70% isopropyl alcohol.

Pour 1–2 fluid ounces of alcohol into the jar. Screw the jar onto the lid. If you plan to have the thrips identified, use a mixture of half alcohol, half water, and add a drop of detergent. This keeps the thrips from getting too stiff.

Harvest enough sprays to yield 50–100 blossoms. Write down the date, cultivar, and number of sprays used. Removing blossoms from stems speeds drying, but handle them gently during removal to prevent thrips escaping. Put the blossoms into the funnel, place the lamp on the funnel, and turn on the light. Heat from the bulb drives the thrips down and they fall into the alcohol.

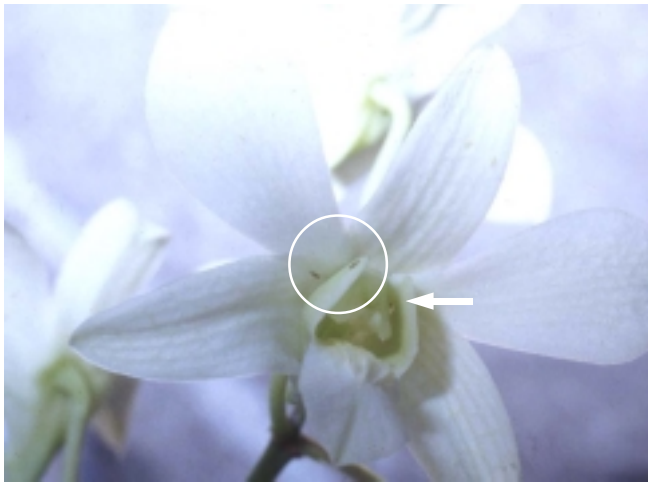
After 8 or more hours, turn off the light and remove the jar. Pour the alcohol into a flat dish. Using a hand lens or magnifying glass, inspect the alcohol for thrips. If aphids or mealybugs are on the flowers, they will also be in the jar. Moths and beetles may be attracted to the light and fall into the funnel. If this occurs, check the fit of the lamp and adjust the plumber's tape to minimize the space between the lamp and the funnel. If the problem continues, seal the space with tape.

Record the number of thrips and divide by the number of sprays. The result of this calculation is the number of thrips per spray. This number, when compared with the numbers from other surveys, shows whether the population is rising or falling.

Finally, clean the funnel and the jar. This is important to avoid contamination of later samples.

Adult thrips (center) are very small. At left, four of them are seen through a hand lens. At right, there are two within the circle and another one less visible in the shadows within the blossom (arrow).





Berlese funnels are easily constructed from locally available materials. Multiple funnels can be placed together on a rack.



References

Hara, A.H., T.Y. Hata, V.L. Tenbrink, and B.K.S. Hu. 1995. Postharvest treatments against western flower thrips [*Frankliniella occidentalis* (Pergande)] and melon thrips (*Thrips palmi* Karny) on orchids. Ann. Appl. Biol. 126:403–415.

Hara, A.H., and T.Y. Hata. 1999. Pests and pest management. In: K. Leonhardt and K. Sewake (eds), Growing dendrobium orchids in Hawaii, production and pest management guide. College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa. pp. 29–45

Hata, T.Y., A.H. Hara, and J.D. Hanson. 1991. Feeding preference of melon thrips on orchids in Hawaii. HortScience 26: 1294–1295.

Hata, T.Y., A.H. Hara, B.K.S. Hu, R.T. Kaneko, and V.L. Tenbrink. 1993. Field sprays and insecticidal dips after harvest for pest management of *Frankliniella occidentalis* and *Thrips palmi* (Thysanoptera: Thripidae) on orchids. J. Econ. Entomol. 86(5):1483–1489.

Hollingsworth, R.G., A.H. Hara, and K.T. Sewake. 2000. Pesticide use and grower perceptions of pest problems on ornamental crops in Hawaii. Journal of Extension 38(1). 11 pp. <http://joe.org/joe/2000february/rb1.html>.

Hollingsworth, R.G., K.T. Sewake and J.W. Armstrong. 2000. Scouting methods for detection of thrips (Thysanoptera: Thripidae) on dendrobium orchids in Hawaii. Manuscript submitted to Journal of Economic Entomology.

Tenbrink, V.L., A.H. Hara, T.Y. Hata, B.K.S. Hu, and R. Kaneko. 1998. The Berlese funnel, a tool for monitoring thrips on orchids. CTAHR publication IP-3, College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa.